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CASE REPORT

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Efficacy of laser therapy in feline sporotrichosis lesion resistant to conventional treatment - case report

Eficácia da laserterapia em lesão por esporotricose felina resistente ao tratamento convencional – relato de caso

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ABSTRACT: Sporotrichosis, an expanding zoonosis in Brazil, is caused by the yeast fungus *Sporothrix* spp., with cats serving as the primary carriers of the disease due to their habits that can contribute to the pathogen's spread. The disease can manifest subclinically or as local and multifocal skin lesions, with multiple lesions involving mucous membranes being more frequent. Treatment is often prolonged, challenging, and requires special care. The objective was to report the case of a 1-year-old female cat diagnosed with sporotrichosis refractory to conventional treatment. The patient was referred for integrative treatment with laser therapy after five months of treatment with itraconazole associated with potassium iodide with successive dose increases and without satisfactory therapeutic response. Six sessions of laser therapy were performed with weekly application of 1J continuous red for 10 seconds in four points of the wound edges and a central point for remission of the lesion, maintaining the drug treatment for another month after the end of the sessions. The patient had no relapses during the subsequent three months of follow-up. Thus, laser therapy has proven to be an effective and promising therapeutic approach for treating sporotrichosis in felines, especially in cases that do not respond adequately to conventional treatment. The combination of different therapeutic modalities can improve the clinical outcomes and quality of life of affected animals, highlighting the importance of integrated approaches in managing this zoonosis.

Keywords: potassium iodide; itraconazole; *Sporothrix*; integrative treatment; zoonosis.

RESUMO: A esporotricose, zoonose em expansão no Brasil, é causada pelo fungo leveduriforme *Sporothrix* spp., tendo os gatos como principais portadores da doença devido aos seus hábitos que podem contribuir para a disseminação do patógeno. A doença pode se manifestar de forma subclínica ou como lesões cutâneas locais e multifocais, sendo mais frequentes as múltiplas com envolvimento de mucosas. O tratamento frequentemente é prolongado, desafiador e demanda cuidados especiais. Objetivou-se relatar o caso de uma gata de aproximadamente 1 ano diagnosticada com esporotricose refratária ao tratamento convencional. Após cinco meses de tratamento com itraconazol associado ao iodeto de potássio com aumentos sucessivos de dose e sem resposta terapêutica satisfatória, a paciente foi encaminhada para tratamento integrativo com laserterapia. Foram realizadas seis sessões de laserterapia com aplicação semanal de 1J contínuo vermelho durante 10 segundos em quatro pontos das bordas da ferida e um ponto central para remissão da lesão, mantendo o tratamento medicamentoso por mais um mês, após o término das sessões. A paciente não apresentou recidivas durante os três meses de acompanhamento subsequentes. Dessa forma, a laserterapia se mostrou uma abordagem terapêutica eficaz e promissora para o tratamento da esporotricose em felinos, especialmente em casos que não respondem adequadamente ao tratamento convencional. A combinação de diferentes modalidades terapêuticas pode melhorar os resultados clínicos e a qualidade de vida dos animais afetados, ressaltando a importância de abordagens integradas no manejo dessa zoonose.

Palavras-chave: iodeto de potássio; itraconazol; *Sporothrix*; tratamento integrativo; zoonose.

INTRODUCTION

Sporotrichosis, an important zoonosis on the rise in Brazil, with a particular emphasis on the South and Southeast regions, is caused by the yeast fungus *Sporothrix* spp., which is commonly found in the environment (Gremião *et al*., 2020; Lucena *et al.*, 2023). Felines present many fungal cells in their lesions. They are the animals most affected by the disease due to their natural behavior of scratching their nails on tree trunks and engaging in territorial disputes, which demonstrates a fundamental role in its transmission and spread (Almeida *et al*., 2018). The greater proximity of humans to their pets also increases the risk of transmission from the cat to the tutor (Araujo *et al*., 2020).

Sporotrichosis can manifest in different forms. Subcutaneous mycosis presents in cats in a subclinical form, as local or multifocal skin lesions and/or in a generalized systemic form, occurring more commonly as multiple lesions with mucosal involvement. The cutaneous manifestation can occur through nodules or ulcers in several locations, with neoplasms and concomitant infections as differential diagnoses (Gremião *et al.*, 2021). The therapy is usually long, costly, and difficult, due to the medication indicated to be administered orally in cats and the zoonotic character of the disease. Minimal manipulation, the use of gloves, and patient isolation are recommended until improvement and clinical cure (Vidal *et al*., 2024). The treatment becomes unfeasible in some cases, such as in reactive felines, and, not infrequently, the animal is

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abandoned or the treatment is not performed correctly or abandoned. As a consequence, relapse occurs (Cruz, 2013; Gremião *et al*., 2021).

Treatment should be instituted based on clinical evaluation, and the drugs recommended by the feline sporotrichosis guideline (Gremião *et al*., 2021) are itraconazole (ITZ) as monotherapy or in combination with potassium iodide for more advanced conditions or when the respiratory system is involved. The use of amphotericin B is indicated for disseminated forms of the disease, although it demonstrates several adverse effects, such as nephrotoxicity, cardiotoxicity, pyrexia, hypotension, nausea, and emesis. The use of complementary therapies, such as thermotherapy, cryosurgery, and surgical procedures, still requires individual evaluation and caution (Gremião *et al*., 2021).

Laser therapy has proven to be a valuable resource in the wound healing process. Additionally, it is not considered an expensive technique, not invasive, and is not capable of inducing microbial resistance (Melo *et al*., 2021). Laser therapy utilizes light energy at various wavelengths and powers to treat a range of clinical conditions, including pain, inflammation, and wounds, through a process known as photobiomodulation (Fesseha, 2020). This study reports the case of a cat diagnosed with sporotrichosis and refractory to conventional treatment with itraconazole in combination with potassium iodide, whose complete therapeutic response was achieved through the association of drug therapy with six sessions of low-frequency laser therapy.

CASE REPORT

A female cat, crossbreed, with 1 year of age, 3.2 kg, whole, negative for IVF and FeLV, without a domicile, with a complaint of lesion to the right thoracic limb for approximately 1 month, emesis, and hyporexia, was treated at the Veterinary Clinic School of the Universidade Federal de Santa Catarina (CVE/UFSC), Curitibanos campus. The tutor reported that an attempt at therapy without a doctor's prescription was made using Oxytetracycline Hydrochloride 6.8 g + hydrocortisone 2.8 g + Vitamin A Palmitate 0.01 g (Terracam® spray), to no avail. The physical examination revealed alertness, a body score of 4 (scale: 1-9), and pale mucous membranes, along with other clinical parameters that showed no changes. On inspection, the lesion of the right thoracic limb was ulcerated, bloody, with perilesional erythema in the index digit, without pain on palpation. Thus, clinical suspicions were granulomatous pododermatitis and sporotrichosis. The cytology of the cutaneous lesion of the limb was performed by imprint collection and the patient was released home with a prescription of meloxicam (0.06 mg/kg every 24 hours – SID) for five days, enrofloxacin (7.8 mg/kg every 12 hours – BID) for five days, in addition to cleaning the wound with gauze soaked in physiological solution, use of spray antiseptic based on chlorhexidine 1% and sunflower oil, three to four times a day. The cytological report indicated that the sample was inappropriate for diagnosis.

The patient returned after two weeks, complaining of an increased lesion with bleeding. A new sample was collected by imprint for cytology, revealing a large amount of inflammatory infiltrate consisting of neutrophils, macrophages, and rare lymphocytes. Neutrophils presented with nuclear emaciation, sometimes with evident loss of nuclear segmentations, as well as pyknosis and karyorrhexia. Macrophages sometimes presented with enlarged dimensions and cytoplasm filled with pleomorphic yeast-like structures, similar to cigars, ranging in size from 3 to 5 µm in diameter and with a clear and thin halo around the pale blue cytoplasm (suggestive of *Sporothrix* spp.). Therefore, the diagnosis was concluded as sporotrichosis.

Thus, blood samples were collected for laboratory tests (ALT, creatinine, and blood count), which were within the reference range for the species. For the treatment of sporotrichosis, itraconazole (12.5 mg/kg SID) was prescribed for four months, meloxicam (0.1 mg/kg SID) for five days, enrofloxacin (7 mg/kg BID) for five days, and dipyrone (25 mg/kg every eight hours – TID) for five days. Silver sulfadiazine cream (10 mg/g, TID) was prescribed for topical use on the lesion for five days.

Approximately three weeks after the start of treatment, contact was made via telephone when the worsening of the condition was observed through photos sent by the tutor. Due to the refractoriness of the condition to the initially proposed treatment, the dose of itraconazole was increased to 25 mg/kg SID, to be used in association with potassium iodide at 5 mg/kg SID. The tutor was again instructed on how to perform the administration carefully and effectively (ensuring that the patient ingests and does not regurgitate the medication) through videos, having stressed the severity of the disease and the importance that instituted treatment be applied effectively. After two months from the start of treatment, the patient had only one lesion behind the left ear and one necrotic lesion in the digit of the right thoracic limb. A new blood sample was collected for a complete blood count (hemogram) and biochemical parameters. All parameters in the blood count were within the reference range. The biochemical tests revealed an increase in ALT (210 U/L; reference range: 6-88 U/L), while albumin, total serum proteins, creatinine, and alkaline phosphatase were within the normal reference values.

After two weeks, the patient returned to the clinic complaining of dyspnea. On physical examination, two residual lesions were found: a papule and an ulcer with erythema in the left ear. Further cytology was performed, with findings suggestive of sporotrichosis. Thus, treatment with itraconazole and potassium iodide was indicated for another 90 days. The lesions still did not completely resolve four months after the start of conventional therapy. The dose of itraconazole was then increased from 25 to 40 mg/kg (totaling 128 mg/day). The dose of potassium iodide was maintained.

After one month, the tutor reported increased nasal volume, dyspnea, sneezing, and hyporexia. The previous lesions had disappeared, but a new ulcerated lesion appeared in the nasal plane, with increased volume, hemorrhage, and dimensions of approximately 1 x 1 x 0.2 cm (Figure 1A). Cytology was repeated, which confirmed the presence of sporotrichosis.

Due to the successive increase in the dose of the medication and treatment failure, it was recommended to maintain itraconazole and potassium iodide. The patient was referred for treatment with laser therapy, using the weekly protocol of 1J (joule) continuous red for 10 seconds, at four points on the edges of the wound, and a central point.

In the second session (7 days after the start of

laser therapy), the tutor reported that the patient no longer scratched the wound. Upon inspection, the appearance of the lesion had improved, with a decrease in diameter (Figure 1B). In the third session (14 days after the start of laser therapy), the patient was no longer scratching the lesion at home, but when she went to the clinic, she rubbed her face on the transport box, causing new bleeding. Upon inspection, the wound appeared similar to that of the previous week, with a more superficial aspect (Figure 1C). By the fourth session (21 days after the start of laser therapy), the lesion had decreased considerably, measuring approximately 2 to 3 mm in diameter, with a small crust present (Figure 1D). In the fifth session, the lesion decreased more, measuring around 1 mm (Figure 1E). In the sixth session, the lesion was slightly hyperemic, alopecic, and without crusts (Figure 1F). The tutor sent photos the following week (Figures 1G and 1H), when complete remission of the wound could be verified. Thus, the laser therapy protocol was finalized. Continued treatment with itraconazole and potassium iodide was recommended for another 30 days.

Figure 1 – Facial evolution during weekly laser therapy sessions. (A) Lesion before the start of laser therapy (Day 0); (B) After 7 days, immediately before the second session (Day 7); (C) Before the third session (Day 14); (D) Before the fourth session (Day 21); (E) Before the fifth session (Day 28); (F) before the sixth session (Day 35). (G and H) Photos sent by the tutor one week after discharge from laser therapy (Day 42).



Source: Images provided by Clínica Veterinária Escola of UFSC, 2023.

After 10 months from the initial consultation, the patient returned to the clinic, presenting with all previously injured areas having recovered hair coverage and no further lesions suggestive of sporotrichosis. Soon after, she returned for the elective ovariosalpingohysterectomy procedure and remained without relapses during the subsequent three-month follow-up.

DISCUSSION AND CONCLUSIONS

After the initial care, the patient reported here was released home with prescriptions for anti-inflammatories, antibiotic therapy, and wound cleaning, following the collection through imprint. Cytology was inconclusive, even after cleaning, which may have been due to contamination caused by the presence of mononuclear cells in the sample. According to Cagnini *et al.* (2012), the initial ulcerated lesions of sporotrichosis may resemble those found in bacterial infections. The clinician should increase their suspicions of fungal infection when treatment with antibiotic therapy does not result in minimal improvement of the lesion. Positivity for sporotrichosis was found when cytology was repeated after treatment with antibiotics and antiseptics. Fungal culture was not performed for this case, which could have been requested during the initial care, as the high fungal load in the digits would have already allowed for positivity in the cytology. According to Gremião *et al.* (2021), cytopathology provides a preliminary diagnosis when there is difficulty in performing fungal culture and/or urgency in obtaining the result, since the positive test allows the initiation of antifungal treatment before the isolation of the *Sporothrix* spp.

Reis *et al.* (2016) and Gremião *et al.* (2022) used proportional treatments with itraconazole (100 mg/cat and 50 to 100 mg/cat, per day, respectively) and potassium iodide (2.5 to 20 mg/kg/day). The first authors achieved a 96.15% clinical cure in an average of 14 weeks of treatment until discharge, although lesions involving the mucous membranes required an average treatment time of 23 weeks. Gremião *et al.* (2022) had an average treatment duration of four months. For the patient, the conventional protocol was adjusted according to the therapeutic response for six months, starting with itraconazole at 12.5 mg/kg SID, up to a maximum of 40 mg/kg (totaling just over 100 mg/cat), along with potassium iodide at 5 mg/kg SID. The dose of iodide could have been increased. Still, it was decided to associate another therapy to avoid worsening the adverse effects that conventional treatment can generate, especially when the two are together. Reis *et al.* (2016) had 50% of patients evaluated on conventional therapy with adverse clinical effects such as vomiting, hyporexia, and weight loss. According to Gremião *et al.* (2022), adverse clinical reactions were observed in 52% of cases when potassium iodide was administered in doses of 2.5–20 mg/kg SID. These adverse reactions include emesis, anorexia, jaundice, apathy, runny nose and eyes, hypothermia, and heart failure (Cruz, 2013).

Two months after the start of treatment, the patient presented a significant increase in ALT in laboratory tests, consistent with Reis *et al*. (2016), who observed that 13.33% of patients with adverse effects to therapy also had elevated serum transaminase concentration. Resistance to the conventional treatment of choice for sporotrichosis, based on itraconazole or its association with iodide, is considered when there is no cure for the disease (Rosa *et al*., 2017; Xavier *et al*., 2019; Bedrikow; Novais-Mencalha, 2022) or when the lesions remain the same or worsen after eight weeks of treatment (Gremião *et al*., 2015). In this report, the patient was initially treated with conventional therapy for six months, during which, in addition to partial improvement, a new nasal lesion appeared, considered

the treatment of choice.

Non-drug therapies are being consolidated and tested for patients with sporotrichosis, including surgical intervention, cryosurgery, thermotherapy, and laser therapy (Rosa *et al.*, 2017; Melo *et al*., 2021; Bedrikow; Novais-Mencalha, 2022). Laser therapy positively helps in the healing process, treatment time, and in the adverse effects of conventional drugs (Santana *et al*., 2023).

After the weekly inclusion of laser therapy, complete remission of the lesion was achieved by the sixth session. Thus, the treatment with laser therapy was completed. The treatment with itraconazole was prolonged for an additional 30 days, following the consensus on the management of feline sporotrichosis (Gremião *et al*., 2021), which defines the criterion for curing feline sporotrichosis as the disappearance of all clinical signs and the maintenance of drug treatment for one month after clinical cure. In the case reported here, a lesion appeared during conventional treatment, in addition to the associated adverse reactions such as hyporexia, which justified the search for complementary therapy. Healing is slower and more difficult when sporotrichosis lesions involve the nostrils and mucous membranes, which worsens the prognosis (Gremião *et al*., 2022).

Laser therapy stimulates the development of fibroblasts, promotes vasodilation and angiogenesis, and enhances lymphatic drainage, resulting in a reduction of edema caused by inflammation. It also stimulates the production of collagen for tissue repair (Lins *et al.*, 2010). When used in felines affected by sporotrichosis, laser therapy was effective in healing when used as monotherapy or in combination with conventional treatment, thus being considered as an alternative tool in patients with adverse clinical signs to conventional therapy (Ribeiro *et al*., 2023). In the reported case, six total sessions at weekly intervals were sufficient to promote clinical cure, similar to Ribeiro *et al.* (2023), who found that, on average, between four and eight sessions were required for the complete cure of patients.

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